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VITAMINS D AND C IN COVID-19

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ABSTRACT

In the absence of effective treatment for COVID- 19, various drugs were empirically used. Contradictory literature data, from adherents to complete denial of the use of vitamins D and C in COVID-19, prompted us to analyze the literature data and express our opinion on this issue. In our country and abroad, many medical centers include vitamins D and C in the therapy of a new coronavirus infection. Almost all organs and systems of our body have receptors for vitamin D. This fact indicates the active participation of vitamin D in protecting against infection, allergies, and prolonging human life. People with vitamin D deficiency are more likely to have respiratory infections, anemia, muscle hypotension, and bone fragility. The use of vitamin D in coronavirus infection is effective with daily intake of physiological doses of vitamin D. Compensation for vitamin D deficiency is important for the activation of interferon-dependent antiviral immunity, and for the prevention of «cytokine storm», normalization of the coagulation system, and for the reduction of chronic inflammation in the presence of concomitant chronic pathologies in the patient. Even the transition from a severe deficiency of vitamin D (25(OH)D < 20 ng/ml) to a moderate deficiency of 25(OH)D (a metabolite of vitamin D, which is used to judge its supply of the body) in the range of 20-30 ng/ml, in Reduces the risk of admission of a patient with pneumonia to the intensive care unit by 3 times and the risk of transfer to mechanical ventilation by 11 times. The use of vitamin C in coronavirus infection is effective by compensating for its existing deficiency and by interacting with other vitamins. An effective way to maintain the level of vitamins D and C in the population is to fortify these vitamins and other nutrients in foods of mass consumption, as well as to take vitamins in other forms. Multivitamins produced in Western countries are mainly designed for people living in these territories, taking into account the common method of fortifying food. For our country, the norms of consumption of vitamins have been substantiated, confirmed by massive studies of the population of different regions.

Key words: Vitamin D, Immune cells, Infection, pediatric, Cholecalciferol, Cytokinestorm.

INTRODUCTION

All vitamins, especially D, A, E and C, can have a positive effect on the patient's health, but they should not be used as the main method of treatment, but in complex therapy to make up for the lack of vitamins. Low levels of vitamin D in the blood are especially common in people over 50 years of age with hypertension, obesity, cardiomyopathy, diabetes mellitus, which are characterized by the presence of chronic inflammation. These categories of patients are more likely to be exposed to a more severe form of a new coronavirus infection (NKI) with the development of a cytokine storm (an avalanche-like increase in concentrations of pro-inflammatory cytokines). A decrease in the severity of chronic inflammation is associated with an increase in the provision of vitamin D and other micronutrients (zinc, folate, vitamin B1, magnesium, omega-3 polyunsaturated fatty acids, myoinositol, vitamin C). Currently, it has been proven that most organs and systems, including immune cells responsible for the antiviral response, have receptors for vitamin D [2, 3]. The activity of immune cells from the T-lymphocyte class largely depends on the level of active metabolites of vitamin D: they are able to both activate and suppress the function of lymphocytes depending on the needs of the body. People with vitamin D deficiency are more likely to have respiratory infections, anemia, muscle hypotension, and bone fragility. Compensation of vitamin D deficiency is important for activation of interferon-dependent antiviral immunity, prevention of cytokine storm, normalization of the blood coagulation system, reduction of chronic inflammation in the presence of concomitant chronic pathologies in the patient. Even the transition from severe vitamin D deficiency (25(OH)D < 20 ng/ml) to moderate deficiency of 25(OH)D (a metabolite of vitamin D, which is used to judge the security of the body in it) in the range of 20-30 ng / ml reduces the risk of admission of a patient with pneumonia to the intensive care unit by 3 times and the probability of transfer to artificial lung ventilation (AV) by 11 times. The effectiveness of vitamin D varies depending on the method of its use: single large (bolus) doses of about 200,000 IU in patients with COVID-19 give little or no effect at all. In case of respiratory viral infection (influenza, COVID-19, RSV infection), it is recommended to take preventive doses of vitamin D3 (1000-2000 IU / day). Dosages of cholecalciferol (vitamin D3) in the range of 2000-4000 IU / day give a more pronounced increase of 25 (OH) D3 in the patient's blood and do not lead to deviations of calcium or parathyroid hormone levels from normal values. It should also be taken into account that vitamin D has a chronotropic (depending on the time of day) effect: its administration in the evening, after dinner, is more effective and gives fewer cases of elevated calcium levels in the blood. Own data and a review of the literature

show a decrease in the frequency of respiratory viral infections by more than 3 times when taking vitamin D and its metabolites. Water-soluble vitamin C has antiviral, immunomodulatory, anti-inflammatory and antioxidant effects. Recent data indicate the ability of vitamin C to reduce oxidative stress, increase interferon production, and support the anti-inflammatory effect of glucocorticoids (adrenal hormones used in the treatment of COVID-19). The normal level of vitamin C in the blood is 50 mmol/l. The norm of dietary intake, according to the recommendations of the Institute of Nutrition of the Russian Academy of Medical Sciences and according to the norms of other countries, is 90-100 mg for men and 80 mg for women. The Swiss Nutrition Association recommends 200 mg for the entire population, especially for people over 65 years of age. For respiratory infections, it is recommended to use 1000 mg of vitamin C per day. With the advent of COVID-19, in the absence of treatment methods, large doses of vitamin C (up to 2-24 g per day) were prescribed, based on previous data on the ability of high doses of vitamin C in severe pneumonia and sepsis to reduce the duration of stay on a ventilator and mortality of patients.The use of vitamin C is effective in severe COVID-19. This conclusion was reached by an international group of scientists who analyzed more than 100 studies – the findings were published in the journal *Nutrients*. The study was co-authored by the head of the Intensive Care Unit of the Eastern Virginia Medical School, Professor Paul Marik. The doctor developed a method of using vitamin C in the treatment of COVID-19 along with anticoagulants. Paul Marik managed to achieve a significant reduction in the mortality of seriously ill patients with coronavirus]. Analysis of other literature data involving randomized trials (patients who did not receive the drug were studied in parallel) does not always confirm the therapeutic efficacy of vitamin C in COVID-19. In patients receiving high doses of vitamin C, loose stools and the formation of kidney stones are noted. But the fact remains: 62% of total pneumonia in COVID-19 is accompanied by vitamin C deficiency.Vitamin C deficiency is usually accompanied by a deficiency of other vitamins. It is known that the activity of vitamin D, which is considered a hormone of the immune system, depends on the body's supply of vitamins C, B_2, B_6, PP, K [14, 15]. Perhaps vitamin C indirectly affects the course of infection through vitamin D. Vitamin C helps kill the virus and reduces the symptoms of infection. Although it's not a cure for COVID, it can just save lives and definitely ease the severity of the infection.

Protection of the body from infections, including NCIS, depends on the body's supply of vitamins D, C, B_2, B_6, PP, K. An effective way to maintain the level of vitamins D and C in the population of different countries is to enrich with

these vitamins and other nutrients of food products of mass consumption, as well as taking vitamins in other forms. Multivitamins produced in Western countries are mainly designed for people living in these territories, taking into account the widespread method of fortification of food. For our country, the norms of vitamin intake are justified, confirmed by mass studies of the population of various regions by employees of the Institute of Nutrition.

Conclusions

Vitamins should not be used as the main method of treatment. They are always used in complex therapy and should make up for the existing lack of vitamins. We should not "put out the fire", but prepare the body in a timely manner for a worthy response to incoming calls.

Almost all organs and systems of the body have receptors for vitamin D. This fact testifies to his active participation in protecting against infection, preventing allergies, prolonging life. People with vitamin D deficiency are more likely to have respiratory infections, anemia, muscle hypotension, and bone fragility.The normal level of vitamin D in the blood reduces the risk of admission of a patient with pneumonia to the intensive care unit by 3 times and transfer to a ventilator by 11 times. Compensation of vitamin D deficiency is important for activation of interferon-dependent antiviral immunity, prevention of cytokine storm, normalization of the coagulation system in patients with coronavirus infection.The use of vitamin D is effective with daily intake of its physiological doses mainly in the evening.The use of vitamin C in coronavirus infection is effective by compensating for its deficiency and interaction with other vitamins.An effective way to maintain the level of vitamins in the blood of the population is to enrich with these vitamins and other nutrients food products of mass consumption and the use of vitamin drinks, balanced according to the needs of different groups of the population of a particular country.

REFERENCES

1. Gromova O. A., Torshin I. YU., Malyavskaya S. I., Lapochkina N. P. O perspektivakh ispol'zovaniya vitamina D i drugikh mikronutriyentov v profilaktike i terapii COVID-19 // RMZH. 2020; 9: 32-38. [Gromova O. A., Torshin I. Yu., Malyavskaya S. I., Lapochkina N. P. On the prospects of using vitamin D and other micronutrients in the prevention and therapy of COVID-19 // RMJ. 2020; 9: 32-38.]

2. Gromova O. A., Torshin I. YU., Spirichev V. B. Polnogenomnyy analiz saytov svyazyvaniya retseptora vitamina D ukazyvayet na shirokiy spektr potentsial'nykh primeneniy vitamina D v terapii // Meditsinskiy sovet. 2016; 1: 12-21. [Gromova O. A., Torshin I. Yu., Spirichev V. B. Genome-wide analysis of

vitamin D receptor binding sites indicates a wide range of potential applications of vitamin D in therapy // Medical sovet. 2016; 1: 12-21.]

3. Rusnak F. I., Tsybysheva A. K., Pinelis V. G., Litvinova N. N. Narusheniye obmena vitamina D i primeneniye yego metabolitov pri khronicheskikh zabolevaniyakh pochek u detey // Voprosy meditsinskoy khimii. 1992; 4 (38): 52-57. [Rusnak F. I., Tsybysheva A. K., Pinelis V. G., Litvinova N. N. Disorder of vitamin D metabolism and the use of its metabolites in chronic kidney diseases in children // Voprosi of medical chemistry. 1992; 4 (38): 52-57.]

4. Hurwitz J. L., Jones B. G., Penkert R. R. et al. Low Retinol-Binding Protein and Vitamin D Levels Are Associated with Severe Outcomes in Children Hospitalized with Lower Respiratory Tract Infection and Respiratory Syncytial Virus or Human Metapneumovirus Detection // J Pediatr. 2017; 187: 323-327. DOI: 10.1016/j.jpeds.2017.04.061.27.

5. Covid-19 Treatment Guidtlines: //www.covid19treatment guidelines.nih.gov/ on 11/2/2021.

6. Bergman P., Lindh A.U., Björkhem-Bergman L., Lindh J. D. Vitamin D and RespiratoryTract Infections: A Systematic Review and Meta-Analysis of Randomized Controlled Trials // PLoS One. 2013; 8 (6): e65835. DOI: 10.1371/journal.pone.0065835.

7. Spirichev V. B. O biologicheskikh effektakh vitamina D // Pediatriya. 2011; 6 (90): 113-120. [Spirichev V. B. About the biological effects of vitamin D // Pediatria. 2011; 6 (90): 113-120.]

8. Spirichev V. B. Nauchnyye i prakticheskiye aspekty patogeneticheski obosnovannogo primeneniya vitaminov v profilakticheskikh i lechebnykh tselyakh. Soobshcheniye 1. Nedostatok vitaminov v ratsione sovremennogo cheloveka: prichiny, posledstviya i puti korrektsii // Voprosy pitaniya. 2010; 5: 4-14. [Spirichev V. B. Scientific and practical aspects of pathogenetically justified use of vitamins for preventive and therapeutic purposes. Message 1. Lack of vitamins in the diet of modern man: causes, consequences and ways of correction // Voprosi pitania. 2010; 5: 4-14.]

9. Hin H., Tomson J., Newman C. et al. Optimum dose of vitamin D for disease prevention in older people: BEST-D trial of vitamin D in primary care // Osteoporos Int. 2017; 3 (28): 841-851.

10. Sanchez C. P. Chronotherapy of high-dose active vitamin D3: is evening dosing preferable? // Pediatr Nephrol. 2004; 7 (19): 722-723.

11. Rusnak F. I. Vitamin D i progressirovaniye zabolevaniy pochek // Vestnik nauchno-tekhnicheskogo razvitiya Natsional'naya Tekhnologicheskaya Gruppa (www.vntr.ru). 2009; 11 (27). www.ntgcom.com. UDC 616-03. [Rusnak F. I. Vitamin D and the progression of kidney diseases. Bulletin of Scientific and Technical Development National Technological Group (www.vntr.ru). 2009; 11 (27). www.ntgcom.com. UDC 616-03.]

12. Zhang J., Rao X., Li Y., Zhu Y., Liu F., Guo G., Luo G., Meng Z., De Backer D., Xiang H., et al. High-dose vitamin C infusion for the treatment of critically ill COVID-19 // Res. Square. 2020.

13. Holford P., Carr A., Jovic T. H., Ali S. R., Whitaker I. S., Marik P., Smith D. Vitamin C — An Adjunctive Therapy for Respiratory Infection, Sepsis and COVID-19 // Nutrients. 2020; 12 (12): 3760. https://www.mdpi.com/2072-6643/12/12/3760.

14. Spirichev V. B. Kontseptsiya effektivnogo primeneniya vitaminov / D3 + 12 vitaminov/ v profilaktike i korrektsii osnovnykh neinfektsionnykh zabolevaniy sovremennogo cheloveka // Pishchevyye ingrediyenty: syr'ye i dobavki. 2013; 1: 24-32. [Spirichev V. B. The concept of effective use of vitamins /D3 + 12 vitamins/ in the prevention and correction of major non-communicable diseases of modern man // Food ingredients: raw materials and additives. 2013; 1: 24-32.]

15. Spirichev V. B. Vitaminy i obogashchennyye imi produkty v pitanii i podderzhanii zdorov'ya sovremennogo cheloveka // Voprosy diyetologii. 2012; 3 (2): 31-34. [Spirichev V. B. Vitamins and products enriched with them in nutrition and maintenance of modern human health // Voprosi dietologii. 2012; 3 (2): 31-34.]